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| 10/735,871 | 12/16/2003 | Leonardo Baldassarre | 3816-56 | 5462 |

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EXAMINER

VERDIER, CHRISTOPHER M

| | |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
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3745

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/735,871

Applicant(s)

BALDASSARRE ET AL.

Examiner

Christopher Verdier

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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Receipt and entry of Applicants' Preliminary Amendment dated December 16, 2003 is acknowledged.

Oath/Declaration

The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

The specification to which the oath or declaration is directed has not been adequately identified. See MPEP § 602.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "b2" and "b3" (page 6, lines 8-9). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

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The drawings are objected to under 37 C.F.R. 1.84(h), because figures 1 and 2 are connected by projection lines, which should be removed. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informality: Appropriate correction is required.

On page 4, line 11, the reference to claim 1 is objectionable and should be deleted.

Examiner's Suggestions to Claim Language

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The following are suggestions to improve the clarity and precision of the claims:

In claim 3, line 2, "i.e." may be changed to -- which is --.

In claim 7, line 3, "CFD i.e." may be deleted.

Claim Objections

Claims 2-5 and 7-8 are objected to because of the following informalities: Appropriate correction is required.

Claims 2-5 and 8 are replete with the terms "the said blading" (for example, claim 2, line 2). Either "the" or said" should be deleted from the terms.

Claims 2-5 and 8 are replete with the terms "the said blades" (for example, claim 2, line 2). Either "the" or said" should be deleted from the terms.

In claim 2, line 5, "Dp_in" should be changed to -- Dp in --.

In claim 7, lines 3-4, "(in other words a method for fluid-dynamics calculation)" is superfluous and should be deleted.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 1, line 2, "it comprises blading with blades" is unclear; this states that the diffuser blading additionally has blades thereon, which is inaccurate, because there is only one

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set of blades disclosed. In claim 2, line 3, "between 0.5 and 1, including extreme values" is unclear as to scope, because the range does not have a clear starting point and a clear ending point, and it is unclear whether "including extreme values" is meant to include the end values of the range, or values outside the range. In claim 3, line 4, "between an angle of 0 degrees and an angle of 10 degrees, including extreme values", is unclear as to scope for the same reason with regard to claim 2. In claim 4, line 4, "between 1.04 and 1.14, including extreme values" is unclear as to scope for the same reason. In claim 5, line 4, "between 1.25 and 1.35, including extreme values" is unclear as to scope for the same reason.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 6, and 9, as far as they are definite, are rejected under 35 U.S.C. 102(b) as being anticipated by Bandukwalla 4,850,795. Note the centrifugal compressor diffuser 10 having low solidity vanes 14, with the blading having a strength of less than 1.0, and the pitch being defined by formula as the ratio $\pi D_p \sin Z$. The recitation in claim 6 of "it is used in

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centrifugal compressor stages with a coefficient of flow of 0.03 or less", and the recitation in claim 9 of "it is used for delivery of a centrifugal compressor for re-injection" are recitations of intended use and have not been given weight. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Claims 1-2, 4, 6, and 8-9, as far as they are definite, are rejected under 35 U.S.C. 102(b) as being anticipated by Bandukwall 4,824,325. Note the centrifugal compressor diffuser 10 having low solidity vanes 11, with the blading having a strength of less than 1.0, and the pitch being defined by formula as the ratio $\pi D_p \sin Z$. The ratio between the diameter of an intake edge of the blades and an outer diameter of an impeller is 11.341/10.687, which is 1.06. The recitation in claim 6 of "it is used in centrifugal compressor stages with a coefficient of flow of 0.03 or less", and the recitation in claim 9 of "it is used for delivery of a centrifugal compressor for re-injection" are recitations of intended use and have not been given weight. The vanes are airfoils from NACA 65 design data, and are therefore optimized by experimentation that was used to determine the NACA 65 design.

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Claims 1-2, 4, 6, and 9, as far as they are definite, are rejected under 35 U.S.C. 102(e) as being anticipated by Masutani 6,607,353 (figures 1-2). Note the centrifugal compressor diffuser 14 having blades 16A, 16B, with the blading 16A having a strength of less than 1.0, with the blading 16B having a strength of 0.5 to 2.0, and the pitch being defined by formula as the ratio $\pi D_p \sin Z$. The ratio between the diameter of an intake edge of the blades 16A and an outer diameter of an impeller is 1.05 to 1.30. The recitation in claim 6 of "it is used in centrifugal compressor stages with a coefficient of flow of 0.03 or less", and the recitation in claim 9 of "it is used for delivery of a centrifugal compressor for re-injection" are recitations of intended use and have not been given weight. See column 5, lines 17-26.

Claims 1-4, 6, and 8-9, as far as they are definite, are rejected under 35 U.S.C. 102(b) as being anticipated by the article "A Study on Centrifugal Impeller and Diffuser Flow" (figures 2-3 and Table I). Note the unnumbered centrifugal compressor diffuser having unnumbered blades, having a strength y/t of 0.5 (note figures 12 and 15), and the pitch being defined by formula as the ratio $\pi D_p \sin Z$. Because the diffuser blades are straight, they have an angle of deflection of about 0 degrees. The ratio between the diameter of an intake edge of the blades and an outer diameter of an impeller is 1.1. The recitation in claim 6 of "it is used in centrifugal compressor stages with a coefficient of flow of 0.03 or less", and the recitation in claim 9 of "it is used for delivery of a centrifugal compressor for re-injection" are recitations of intended use and have not been given weight. See column 5, lines 17-26. Because the diffuser design is based on performance maps (page 689, second to last paragraph), it is optimized by experimental methodology.

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Claims 1, 4-6, and 9, as far as they are definite, are rejected under 35 U.S.C. 102(b) as being anticipated by Kobayashi 4,938,661 (figures 1-2 and Tables 1-2). Note the centrifugal compressor diffuser having blades 8d. The ratio between the diameter of an intake edge of the blades r and an outer diameter of an impeller R is 1.03-1.1. The ratio between the diameter of an outlet edge of the blades and an outer diameter of an impeller is $107.5/85$, which is 1.26, and $98/75$, which is 1.131. The recitation in claim 6 of "it is used in centrifugal compressor stages with a coefficient of flow of 0.03 or less", and the recitation in claim 9 of "it is used for delivery of a centrifugal compressor for re-injection" are recitations of intended use and have not been given weight.

Claims 1, 6, and 8-9, as far as they are definite, are rejected under 35 U.S.C. 102(b) as being anticipated by Seleznev 3,973,872. Note the centrifugal compressor diffuser 2 having blades 10. The coefficient of flow is 0.03 or less (note table I and figure 7). The recitation in claim 9 of "it is used for delivery of a centrifugal compressor for re-injection" is a recitation of intended use and has not been given weight. The diffuser design is optimized by experimental methodology (see column 8, lines 48-61).

Claims 1, 3, 6, and 9, as far as they are definite, are rejected under 35 U.S.C. 102(b) as being anticipated by Nishida 5,228,832 (figures 1-2). Note the centrifugal compressor diffuser 2 having blades 7. Because the diffuser blades are straight, they have an angle of deflection of about 0 degrees. The recitation in claim 6 of "it is used in centrifugal compressor stages with a coefficient of flow of 0.03 or less", and the recitation in claim 9 of "it is used for delivery of a

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centrifugal compressor for re-injection" are recitations of intended use and have not been given weight.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 7, as far as it is definite, is rejected under 35 U.S.C. 103(a) as being unpatentable over Bandukwalla 4,850,795 or Kobayashi 4,938,661. Bandukwalla 4,850,795 or Kobayashi 4,938,661 disclose centrifugal compressor diffusers with blades substantially as claimed as set forth above, but do not disclose that the blades are optimized by Computational Fluid Dynamics.

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Official Notice is taken that Computational Fluid Dynamics is a conventional and well-known method of optimizing the design of blades known to skilled designers in the art of turbomachinery and fluid mechanics, for the purpose of reducing blade losses and increasing efficiency.


It would have been obvious at the time the invention was made to a person having ordinary skill in the art to optimize the diffuser blade design in the diffusers of either Bandukwalla 4,850,795 or Kobayashi 4,938,661, for the purpose of reducing blade losses and increasing efficiency.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (703)-308-2638. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (703) 308-1044. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.V.
November 1, 2004


Christopher Verdier
Primary Examiner
Art Unit 3745